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A STUDY OF THE SPARROW HAWKS (SUBGENUS
TINNUNCULUS) OF AMERICA, WITH ESPEC-
IAL REFERENCE TO THE CONTINENTAL
SPECIES (*FALCO SPARVERIUS* LINN.)*

BY EDGAR A. MEARNS.

THIS subgenus has its centre of development in the tropical portion of America, two of the three† known American species being peculiar to the West Indian region, the third, *Falco* (*Tinnunculus*) *sparverius*, extending from the equator southward to the extremity of the Southern American continent, and northward to Hudson's Bay and Alaska, extreme points in its longitudinal dispersion being Unalaska and Pernambuco. These species may be recognized by the following :

Synopsis of the American Species.

A. Species having a single color phase — not dichromatic. Front and auriculars distinctly whitish; back always entirely rufous, with or without black bars or spots; with no conspicuous superciliary stripe of white; under surface of wing with the quills (usually) barred entirely across with black and white.

a. Vertex with or without a patch of rufous; tail of male with a single subterminal zone of black; rump and anterior portion of back immaculate; spots of under surface small and rather sparse.

1. *Falco sparverius*. *Male*: Top of head varying from light bluish ash to blackish slate, usually without conspicuously darker shaft streaks, particularly on the rusty crown patch, when present; wings bluish ash, with a few small black spots. *Female*: Black bars of tail narrower than the fulvous rufous interspaces; spots of under surface reddish brown, tending to form longitudinal streaks.

Habitat.—Whole of North and South America, straggling to the West Indies.

* The Sparrow Hawks of America are wholly different from the bird which bears the same name in Europe. The latter belongs to the genus *Accipiter* (the same that includes our Cooper's and Sharp-shinned Hawks), while the American Sparrow Hawks belong to the subgenus *Tinnunculus* of *Falco* in which are included the Kestrel, Red-footed Falcon, Lesser Kestrel, and other Old World species.

† I have here adopted Mr. Ridgway's recent views (see 'The Auk,' Vol. VIII, January, 1891, p. 113) in uniting *Falco dominicensis* Gmel. and *F. sparveroides* Vig., of the West Indies, as dichromatic phases of a single species, the material at my command being insufficient to enable me to decide the question independently.

b. Vertex always (?) rufous; tail of male crossed by numerous black bars; rump and anterior portion of back transversely barred or spotted with black; breast and sides thickly spotted with large black spots.

2. *Falco caribbæarum*. *Male*: Top of head dark bluish plumbeous, the feathers (including those of the rusty vertex) streaked with black centrally; wings dark bluish plumbeous, very heavily spotted with black; entire rufous surface heavily barred with black. *Female*: Black bars of tail broader than the castaneous rufous interspaces; spots of under surface black, many of them cordate.

Habitat.—Lesser Antilles.

B. Two distinct color phases. Front and auriculars dusky; back entirely plumbeous in the male (dark phase); with broad white frontal and superciliary stripes; under surface of quills white, merely serrated with dusky along the terminal portion of the shaft (light phase).

3. *Falco dominicensis*. *Male* (dark phase): Above, dark plumbeous, except the tail, which is as in *sparverius*. Below, deep rufous, with a wash of plumbeous across the jugulum, and the throat grayish white. Inner webs of quills slaty, crossed by indistinct dusky bars. There is sometimes a trace of rufous in the plumbeous of crown. *Female* (dark phase): Top of head slate-gray; upper parts rufous brown, banded with dull black; underparts, including lining of wings, castaneous rufous; inner webs of primaries dull grayish rufous, with transverse cloudings of dusky. *Male* (light phase): Above rufous, as in *sparverius*, but with little transverse spotting of black on scapulars; crown and wings bluish gray, the former usually without a rusty centre; a conspicuous white superciliary stripe, and front broadly white; 'moustache' across cheeks indistinct or obsolete. Below, immaculate white, the breast stained with a delicate shade of salmon-rufous. *Female* (light phase): Above similar to the dark phase, but with crown bluer, showing a patch of rufous. Below buffy white or very pale rufous, finely spotted or streaked with pale rusty brown; throat white.

Habitat.—West Indies, (Cuba, Hayti, San Domingo, and Porto Rico), casually to southern Florida (?).

Before discussing the geographical races and incipient forms of the single continental species, depending on locality, it will be well to consider the variations, in all these species, which depend upon sex, age, and season.

Dimorphism is confined, so far as known in this group, to the West Indian Sparrow Hawk (*Falco dominicensis*). In this species there is a light phase which quite closely resembles typical *sparverius* of the eastern United States, but is whiter, with some of the dark markings reduced or obsolete, and the colors finer and brighter, and a dark phase in which the markings are intensified, the rufous of the upper surface, except the

tail, replaced by dark plumbeous in the male, and both sexes deep rufous, on the underparts.

Sexual Differences.—In all plumages succeeding that of downy nestlings, the sexes are readily distinguishable. In addition to its larger size, the female may be instantly recognized by the absence of plumbeous on the wings. The regular transverse barring or spotting from the nape to the extremity of the tail is diagnostic of the female in all but *Falco caribbeus*, in which the male is similarly banded, and *F. sparverius aequatorialis*, in which the rump of the female is immaculate. In all, the plumage of the female is duller; and, as a rule, the markings of the underparts (except in *Falco caribbeus*) are brownish instead of black, and tending to longitudinal stripes rather than round spots. The female of *Falco sparverius*, except in the subspecies *aequatorialis*, usually lacks the tawny ochraceous buff of the underparts which distinguishes adult males. The reddish crown patch is common to both sexes and all ages, though often much reduced in size or entirely absent, except in specimens from the interior region of North America, in which it is largely developed. The feathers of the rusty crown patch are often more streaked centrally with dusky or plumbeous in females than in males.

Differences depending on Age.—The age differences in the American species of this group are limited to slight modifications of the adult, a marked peculiarity being the early age at which the perfect adult plumage is acquired. All winter specimens from north of the equator are practically in adult plumage, though young birds at that season are distinguishable by the paler yellow of the cere and feet, as well as by anatomical conditions. I am inclined to the opinion that the oldest males, in *F. sparverius* are those having the least number of spots on the under surface, though Florida specimens show less spotting than those from other regions on the continent of America (unless those from near the coast in equatorial South America), thus approaching, as they sometimes do in other respects, the (usually) unspotted West Indian *Falco dominicensis*. Specimens from the western United States, Mexico, Central and Southern America, are all spotted below, though a few from Texas and Arizona are slightly so.

The series of young males of the year from east of the Mississippi River comprises specimens taken in June, July, August, September and October, those captured during the last month being mostly in the patchy condition incident to the transition from the young to the adult plumage. These young males differ from adults at the same season in having the feathers edged with white or pale rusty, and the markings suffused. The buffy ochraceous color of the underparts is much paler, usually cream-buff, though the intensity varies much with the individual, even in young of the same brood. The spotting, which is chiefly confined to the sides or flanks in old males, extends to the front of the chest, where the spots have a linear instead of rounded form. In most very young birds the ashy feathers of the crown and wing-coverts have rusty edges, the former with narrow, dark shaft-streaks, also extending to the rusty crown patch

which is somewhat restricted; but in a very young example, collected by Spencer F. Baird, at Carlisle, Pennsylvania, June 6, 1844 (Smiths. Inst., No. 1598), there is very little pale edging to the feathers of the upper surface, which appear almost as sharply patterned as in adults, and the underparts are strongly ochraceous fulvous.

In the young there is also a stronger tendency to irregularity in the pattern of the tail-feathers, in which the rufous is sometimes restricted to the middle pair and irregular areas upon those next them, the outer four or five feathers being variously banded, striped, or spotted with black, cinereous, and ochraceous, especially on their terminal portion; but variations in the amount of variegation of the tail are not confined to young birds, adults, especially from the eastern United States, showing very considerable departures from the common style, in which the tail is plain rufous, subterminally banded with black, and tipped with (usually) white, with the outer feather, and often the outer portion of the one next it varied with black and white, but which quite frequently have strong indications of additional black bands, and variable areas of ochraceous white, ochraceous ash, and rusty, scattered promiscuously over the inter-spaces.

The transverse barring of black on back and scapulars is sometimes nearly as in adults, but the bars are usually more numerous, extending nearer to the nape. The tips of the wing quills are broadly edged with white; and the terminal band on the rectrices is more apt to appear rusty instead of white, with the central pair often cinereous.

I am unable to appreciate any intermediate phase of plumage between that of the first plumage and the adult male of winter. The latter garb is assumed gradually during September and October.

Young females are still more similar to adults, the difference consisting almost wholly in the deeper, more suffused markings, and sharper streaking of the crown.

Seasonal Variation.—An examination of 161 males develops the fact that there is a well-marked difference between the plumages of winter and summer, the difference being in the intensity of coloring. The largest series from one region comes from Arizona. The date of capture has been accurately noted on the labels of 31 males from that Territory, of which number 23 have acquired the adult plumage. Four are moulting birds, changing from the plumage of summer to that of winter, taken from September 15 to October 17; nine specimens, captured between the dates of December 6 and February 19, represent the typical plumage of winter; and ten, taken in April and May, are in the summer plumage of the resident Arizona bird, migrants having departed before that season. April and May specimens are much paler throughout, this being especially noticeable upon the under surface, where the tawny ochraceous buff of the winter plumage is replaced by cream-buff. The three black nape patches appear more distinct, from the paling of the surrounding plumage of the neck, which, in summer, shows as a collar of ochraceous buff. The seasonal difference is so considerable that specimens could readily be as-

signed to the winter or summer plumage without reference to the labels, though one unusually pale winter specimen (No. 29,569, Am. Mus. coll., January 27), and another exceptionally dark one, taken May 28 (No. 51,642, Am. Mus. coll.), approach each other closely. The newly acquired feathers, in the four specimens taken during September and October, are somewhat more deeply colored than in winter birds, in which the plumage has been worn for some time. Three of the four have but little black spotting on the wing-coverts.

There are 55 males from east of the Mississippi River, of which all but 8 have the date of capture fixed. Thirteen of those remaining are young, leaving 34 for comparison as to the seasonal variation. From an examination of this material it appears that, though the individual variation in the depth of coloring is far greater than in Western specimens, often overlapping the seasonal difference, the average seasonal variation is the same as in the Arizona series, just compared. The greatest intensity of coloring is reached in the month of November, when the winter dress is new, at which season the underparts, excepting the throat and crissum, become deep cinnamon rufous, as exemplified by specimens from Pennsylvania (No. 1752, Smithsonian collection, Carlisle, November 25, 1844, S. F. Baird) and Louisiana (Covington, November 15, 1889, G. Kohn). During the first two months of winter this color gradually fades, becoming pale pinkish buff in some examples before the end of February, while others retain a deeper tint through the spring months, through delay in moulting, or being naturally deeper hued than most individuals. As in the Arizona series, the wing-coverts are less spotted with black in winter than in summer, several of them having this portion of the wing entirely plain, while in others the sagittate spots are few in number; and corresponding differences in the seasonal coloration of the upper surface of the body are found, though the pale, buffy collar is indistinct in the Eastern bird. The seasonal variation in other parts of North America corresponds closely to that noted in the above series from Arizona and the eastern United States; but the data at command are insufficient to show the amount and character of seasonal changes in the plumage of the forms from Central and South America, the date of capture having been written on but few labels. The change from the pale summer dress to the darker plumage of winter occurs with the fall moult, from August to October, being complete in most cases by the end of the latter month.

Females are considerably darker in winter than in summer. The dates of capture of 17 females, taken by the writer in central Arizona, cover every month of the year but June and August. Beyond the conditions incident to a change of plumage, the seasonal variation is confined to a paling of the colors in summer, at which season the upper surface is chiefly ochraceous cinnamon instead of the darker, more vinaceous, tint of winter. A similar difference is noted in the females from other regions though the number of specimens from single localities is insufficient for a thorough comparison.

Falco sparverius Linn.

AMERICAN SPARROW HAWK.

Habitat.—Entire continents of both North and South America and adjacent islands, straggling to the West Indies, etc.

The range of the Sparrow Hawk extends through 115 degrees of latitude and 133 degrees of longitude! Few species of birds are capable of following it throughout its breeding range, which is nearly co-extensive with the enormous area of its habitat. That a species of such wide distribution should not vary is scarcely supposable; and, accordingly, we find it exhibiting the results of environmental influences to such a degree that it becomes necessary to recognize no less than six geographical races or subspecies as follows:—

1. *Falco sparverius*. Habitat, northern and eastern United States, south through Mexico and Central America to northern South America.

2. *F. s. deserticolus*. Habitat, southwestern United States, north to northern California and western Montana, south to Mazatlan in north-western Mexico.

3. *F. s. peninsularis*. Habitat, peninsula of Lower California.

4. *F. s. australis*. Habitat, whole of South America, except the North Atlantic and Caribbean coasts; west of the Andes Mountains replaced by or mixed with the two following.

5. *F. s. æquatorialis*. Habitat, Ecuador.

6. *F. s. cinnamominus*. Habitat, Chile and western Brazil.

The above arrangement of the subspecies of *Falco sparverius* is based on an examination of 297 specimens,* of which 241 are from North America north of Mexico (102 from east and 139 from west of the Mississippi River), 9 from Mexico, 11 from Lower California, 13 from Central America, and 23 from South America, the several political divisions being represented as fol-

* For the use of this material I wish to acknowledge my obligation to Mr. Robert Ridgway (for the contribution of 157 specimens in the collection of the Smithsonian Institution), Dr. J. A. Allen (70 specimens from the American Museum of Natural History), Mr. George B. Sennett (18 specimens from Texas and Pennsylvania), Mr. Charles W. Richmond (16 specimens from Montana and Maryland), Mr. Gustave Kohn (11 specimens from Louisiana), Mr. G. S. Miller, Jr. (10 specimens from Florida, Colorado, Massachusetts, and Nova Scotia), Mr. Jno. H. Sage (8 specimens from Connecticut), Mr. F. C. Browne (2 specimens from Florida), Mr. G. H. Ragsdale (2 specimens from Texas), Mr. Frank X. Holzner (3 specimens from Minnesota), and to Mr. T. R. Taylor, of Rochester, New York, for the generous offer of his collection of mounted Sparrow Hawks.

lows: Northern British America, 2; Nova Scotia, 3; British Columbia, 8; Massachusetts, 2; Connecticut, 11; New York, 1; New Jersey, 1; Pennsylvania, 14; Maryland, 6; District of Columbia, 1; Virginia, 1; Ohio, 1; Tennessee, 1; Illinois, 9; Florida, 36; Louisiana, 12; Minnesota, 3; North and South Dakota, 10; Montana, 12; Washington, 1; Oregon, 2; Wyoming, 3; Colorado, 7; Nevada, 4; Texas, 19; Arizona, 51; California, 20; Lower California, 11; Mexico, 9; Costa Rica, 5; Nicaragua, 1; Guatemala, 7; Brazil, 8; British Guiana, 1; Bogota, 2; Ecuador, 3; Peru, 1; Chile, 3; Argentine Republic, 1; Paraguay, 3; Strait of Magellan, 1.

A critical survey of this material shows that there are as many regional phases in the American Sparrow Hawk as there are subspecies of Horned Larks (*Otocoris alpestris*); but, unlike that species, these differences are of so slight a character as to be insusceptible of intelligent expression in written descriptions, in the majority of cases; and it is deemed inadvisable to separate as subspecies slight forms that could not be distinguished with reasonable certainty without reference to the locality. The six subspecies here recognized are capable of ready recognition when average examples are compared with the form to which they are most closely related.

Subsp. *sparverius* Linn.

As observed by Mr. Ridgway, the most distinct and characteristic examples of the *sparverius* type come from the highlands of Mexico and central America; but, as Linné described it from specimens obtained in the eastern United States, breeding birds from that general region will be described as typical *sparverius*.

Adult male (based on No. 26,922, Smiths. Inst., Nova Scotia, taken, with female and one egg, in June, by W. G. Winter). — Back, upper tail coverts, crown patch, and tail, vinaceous cinnamon rufous, the back and scapulars rather sparingly barred with black, the tail tipped with white, with a broad, subterminal band of black, the outer feather white with four black bars on the inner web and a rufous stripe along the inner edge of the basal half of shaft; outer web of the next feather with an ashy white area in which there is a black spot. Wings bluish gray, with quills black, serrated with white on inner webs; coverts with small, oval, black spots. Breast ochraceous buff, fading to pale buff posteriorly; flanks with several rows of roundish, black spots; under surface of wing white, barred with

dull black on quills, sparingly spotted with black on under wing-coverts; top of head, bluish gray; forehead, ear-coverts, an inconspicuous superciliary line, and chin, white; moustache, a large postauricular patch and three cervical patches, black. Iris, hazel. Bill, cere, tarsi and toes, deep chrome; claws black.

Adult Female (based on No. 77,907, Smiths. Inst., Laurel, Maryland, May 4, 1879, collected by G. Marshall).—Upper surface of body cinnamon rufous, inclining to castaneous, transversely barred with blackish; quills dusky, barred with rusty and white. Below dirty white, with markings of sepia on chest and sides, the spots being chiefly linear on the chest, and subcordate on the flanks; posteriorly immaculate. Head as in the male. Tail rufous like the back, with about twelve bars of black.

Young Male (No. 1598, Smiths. Inst., Carlisle, Pennsylvania, June 6, 1844; collected by S. F. Baird).—Similar to adult male, but with spotting of under surface more as in the adult female, the markings extending across the chest as numerous, lanceolate, black spots. The tips of the quills are broadly edged with whitish; tip of tail pale rusty, plumbeous on central feathers; three outer feathers with incomplete bars of black and bluish ash.

Young Female (No. 1599, Smiths. Inst., Carlisle, Pennsylvania, June 6, 1844; collected by S. F. Baird).—Similar to adult female, but darker, with the upper surface more castaneous, the markings more diffused, the under markings nearly all tending to form broadly linear streaks, instead of being cordate on the flanks; under surface tinged with ochraceous; tips of quills edged with rusty white, top of head, including reddish crown patch, with dark shaft-streaks to the feathers.

Comparison of the specimens from east of the Mississippi River, excluding those from Florida and the Gulf Coast, shows the following variations. The rusty crown patch varies greatly in size, often being restricted to a mere trace, and is wholly absent in six specimens, five males and one female, two of which are from Connecticut, three from Pennsylvania, and one (female) from Mt. Carmel, Illinois, representing both winter and summer plumages. The absence or restriction of the crown patch seems to be indicative of a high degree of development, occurring in very old males, and associated with less spotting of the under surface, and extension of a bluish color—so characteristic of extreme adolescence in the genus *Falco*—to the crown, back, scapulars, rump and tail; but it should be remarked, in passing, that the amount of variegation of the tail with black and white on the outer feathers, or of gray and black barring, appears to be partly dependent on age, and subject to extreme variation in specimens from the same locality, some having only a portion of the outer

tail-feather variegated with black and white, others having two or three outer feathers varied with bluish, white and black, while in extreme cases the rufous is limited to the basal portion of the middle feathers, the rest of the tail being crossed by three or four more or less complete bars of black, the intermediate spaces being bluish centrally, changing to whitish on the outer feathers. The single female in which the crown patch is wanting (No. 84,478, Smiths. Inst., Mt. Carmel, Illinois, October 5, 1874; J. L. Ridgway), has the top of the head brownish slate, almost as in *Falco dominicensis*.

All of the males from the eastern United States have a rather liberal amount of transverse black markings on the rufous feathers of the back and scapulars, though the bluish gray of the wings often encroaches considerably on this area; and the feathers of the rump and upper tail-coverts are quite often of the same color, the latter with a black central spot.

The white edging to the tips of the tail-feathers often varies to cinereous (most often on the central pair), rusty, or yellowish or grayish white. Sometimes the central feathers have gray tips enclosing a central or two lateral rufous spots, as seen in some examples of the light phase of *F. dominicensis*.

With a good series from Florida and the Gulf Coast, I am unable to characterize this littoral form in such a manner that specimens could be distinguished with any certainty from typical *sparverius* of the Eastern States, though there are appreciable average differences which strike the eye of those accustomed to making critical comparisons. The alleged subspecies *isabellinus* is described as having the bluish ash of the head changed to plumbeous, without the central patch of rufous, the breast and underparts strongly ochraceous, and the spotting much reduced in amount, especially below. Except as regards the last particular, and a slight disparity of size, the characters assigned prove to be wholly inconstant; and, accordingly, the name has been dropped from our check-lists. The crown patch is more frequently absent in specimens from the northward of the latitude of Tennessee and Virginia than south of that; and the top of the head averages more darkly plumbeous in northern birds than in those of Florida. Respecting the intensity of the ochraceous tinge on the underparts of the male, the difference between the two series is slight, averaging about the same. It is most intense

in two fall specimens coming, respectively, from Louisiana (Covington, November 15, 1889, G. Kohn) and Pennsylvania (No. 1752, Carlisle, November 25, 1844, Spencer F. Baird). The two palest males are from Florida (No. 110, Miakka, April 10, 1887, J. C. Cahoon, No. 5306, collection of G. S. Miller, Jr.) and Connecticut (No. 939, Portland, April 12, 1887, Jno. H. Sage), taken in spring. The Florida specimen is entirely immaculate below, with only a trace of the usual transverse spotting on the back and longest scapulars, and with a moderate amount of black spotting on the wing-coverts; while the Connecticut bird has less spotting than usual in northern specimens. The former shows some resemblance to the light phase of the West Indian *F. dominicensis* in the blueness of the top of the head, and whiteness of the under surface of the wing, in which the blackish transverse bars are obsolete on the outermost feather except on its terminal half, where they do not cross the entire web; but it has a large rusty crown patch, and a well-developed black moustache, besides lacking the white front and superciliary line and having the tail entirely different. In these two specimens the breast is very slightly tinged with ochraceous buff. In a specimen (No. 1301) collected by Mr. Frank M. Chapman at Pine Island, Florida, January 30, 1888, there is also considerable resemblance to the pale phase of *F. dominicensis*. The crown is of precisely the same shade of bluish ash, and lacks the rusty centre; the breast is tinged with more nearly the same shade of ochraceous; but otherwise it is as in *sparverius*. A resemblance to the West Indian species is also seen in No. 6, Miami, Florida, March, 1851, collected by Mr. F. C. Browne. This bird has the black moustache reduced and mixed with white, and has quite strong indications of the white forehead and superciliary stripe; and the outer web of the outer tail-feather is white with one black spot on the inner web in addition to the one pertaining to the subterminal zone; otherwise as in typical *sparverius*. Other specimens (as No. 100, 150, Smiths. Inst.) from Florida exhibit considerable whitening of the under surface of the wing.

Considering the absence of summer specimens in the series before me, I should say that the resident Sparrow Hawk of Florida is probably paler than that of the New England and Middle States, though many of the winter birds are rather highly colored; that it is much less spotted, especially on the under sur-

face, and is, as might be presupposed, of smaller size, with a rather large beak; beyond this, there is nothing worthy of recognition in the variety *isabellinus* so far as the coast region of the United States is concerned. The series from Louisiana shows the crown to be more darkly plumbeous than in Florida birds.

In the timbered country of the middle district, from Illinois eastward through Ohio, Tennessee, Pennsylvania, etc., there is a tendency to somewhat heavier coloration than farther east.

Sparrow Hawks from the coast region of Texas are similar to those from Louisiana, but in western Texas and the Plains region lying between the Mississippi River and the Rocky Mountains there is a form almost intermediate between typical *sparverius* and *deserticolus* of the Great Basin and contiguous areas of the Southwest, its relationship to the latter being about the same as that existing between *Octocoris alpestris arenicola* and *O. a. adusta* or *chrysolæma*, of corresponding regions.

British North America (Nova Scotia, Moose Factory, Hudson's Bay, Fort Rae, and British Columbia) and the northwestern United States furnish specimens of unusual depth of coloration, though lacking bright rufous tints. In males the spotting of the under surface, usually confined to the sides, extends over a larger area; and in females the under surface is more buffy or rufescent and the under striping broader and browner. Males taken by Captain Charles E. Bendire at Walla Walla, Washington, have the breast of a deep cinnamon color.

Taking in hand the material from south of the United States, all specimens from Mexico, except a pair from Mazatlan collected by Col. A. J. Grayson, and all from Central America, are distinctly *sparverius*. The males have considerable ochraceous on the underparts, and quite distinct moustaches (as much so as in those from Arizona, but less than in Eastern specimens). Nos. 103,357 and 103,358, Smiths. Coll., from Guatemala, have but a trace of rusty on the crown; and No. 33,213, Smiths. Coll., from San José, Costa Rica, has very little. The remaining seven have large rufous crown patches. The tail, as a rule, is less variegated than in specimens from the northern part of the continent, three having but two black spots, and a fourth only one on the lateral feathers, the outer web being plain white, with a narrow black line along the shaft; but a similar condition is noted in specimens from other regions, among which is one from Hudson's Bay.

In the much too small series of these Hawks before me from South America are several, mostly from the northeast coast, that are probably referable to *sparverius*; but most of them are mixed with the subspecies *australis*, found over most of South America.

Comparative measurements.—Average of 10 adult males from north of the latitude of Virginia and Tennessee, including five which have the rufous crown patch well developed, and five which lack the crown patch or exhibit (in two cases) but a trace of it: wing, 188.0; tail, 127.0; chord of culmen, 11.8; width of bill at base, 10.0; tarsus, 36.7; middle toe 23.7 mm. Average of 10 adult males from Florida and Louisiana, including five having the rufous crown, and five in which it is wanting (in one) or much reduced*: wing 179.0; tail, 118.0; chord of culmen, 12.1; width of bill at base, 9.9; tarsus, 34.1; middle toe, 22.7 mm. Average of 10 adult females from the eastern United States north of the latitude of Virginia and Tennessee: wing, 196.0; tail, 130.0; chord of culmen, 12.6; width of bill at base, 11.0; tarsus, 35.8; middle toe, 24.3. Average of 10 adult females from Florida: wing, 190.0; tail, 126.0; chord of culmen, 12.3; width of bill at base, 10.7; tarsus, 34.3; middle toe, 22.2. Average of six adult females from Texas: wing, 200.0; tail, 136.0; chord of culmen, 12.5; width of bill at base, 10.8; tarsus, 35.8; middle toe, 24.3 mm.

From the above measurements it will be seen that Sparrow Hawks from Florida and Louisiana are considerably smaller than those from the Northern States, while those from Texas are larger than in either of the other series.

Falco sparverius deserticolus, SUBSP. NOV.

DESERT SPARROW HAWK.

Habitat.—Southwestern United States, north to northern California and western Montana, south to Mazatlan in northwestern Mexico.

General characters.—Larger than Eastern *sparverius*, with relatively longer tail. This is a desert form from the treeless regions of the Southwest. It is paler, much more rufous, and with a larger crown patch than in the typical form. The black bars on inner webs of quills do not cross

* Comparison of the average measurements of five northern and of five southern male Sparrow Hawks having large rufous crown patches with five others from each region in which it is wanting or reduced to a slight trace, shows the measurements to be almost identical, in the two sets of specimens.

the entire web, as in *sparverius*, but occur as sparse serrations of dusky along outer extremity of shaft, sometimes approaching the condition of whiteness seen in the light phase of *F. dominicensis*, and in some specimens from Florida. Female with more numerous and yellow spotting below, and a redder tone to the under side of the tail. The dark bars of the upper surface are narrower, those of the tail being more often incomplete. As the characters on which this subspecies is based are most apparent in the female, a specimen of that sex has been selected as the type.

Type, No. 51, 636, Am. Mus. Coll., ♀ ad., Fort Verde, Arizona, April 29, 1884, Edgar A. Mearns.

Adult male in summer (based on No. 51,641, Am. Mus. Coll., Fort Verde, Arizona, May 23, 1884).—Back and crown patch, ochraceous buff; sides of neck, buff; upper tail-coverts and tail, pale cinnamon rufous; back and scapulars slightly spotted and barred with black; tail subterminally banded with black, and rather broadly tipped with ochraceous buff, with three outer feathers mixed with whitish or pale cinereous, crossed by irregular black bars, the outer feather white to the base. Wings pale plumbeous; quills black, with more white than black on their inner webs; coverts with numerous oval or rhomboid black spots; edges of crown light cinereous. Underparts cream-buff, with several irregular rows of small black spots on the sides, the outermost being cordate and the innermost linear.

Adult male in winter (Am. Mus. No. 51,654, Fort Verde, Arizona, December 6, 1884).—Above pale vinaceous cinnamon rufous, the crown patch plain rufous, covering nearly all of the top of the head; back and scapulars sparingly barred with black. Tail tipped with white externally, cinereous on tips of middle feathers; outer feather white only on outer web and towards tip, with two black spots on inner web; residue of tail rufous, subterminally banded with black. Wings and edges of crown, plumbeous; coverts sparsely spotted with larger, ovate or cordate, black spots. Underparts pale buff, ochraceous buff on chest, sparingly spotted with black on sides.

Adult female in summer (based on the type).—Above tawny ochraceous buff, barred with dull black with plumbeous reflections; crown patch plain, nearly covering the pale cinereous of the top of the head; quills dusky, chiefly ferruginous white on their inner webs. Below cream-buff, with chest and sides thickly streaked with yellowish clay-color; under surface of tail vinaceous cinnamon.

Adult female in winter (Am. Mus. No. 51,666, Fort Verde, Arizona, January 11, 1888).—Above somewhat darker, inclining to cinnamon rufous, with narrow black shaft-streaks to feathers of crown patch. Below more heavily streaked, those of chest being broader, those of sides and front of abdomen inclining to guttate.

Young male.—Six young of the year, captured at Fort Verde, in the American Museum collection, exhibit the following phases: No. 51,643, July 18, 1884, is more like the adult male than either of the others, having

a large rufous crown patch, with indications of plumbeous central streaks to some of the feathers, the transverse barring of the back and scapulars as usual in adults, and scarcely any rusty or whitish edges to the feathers of crown, rump and coverts, but with white tips to the wing quills, and the terminal band of tail pale rusty, mixed with gray on the middle pair of feathers. The pectoral region is moderately tinged with ochraceous, the dusky linear spots extending forward to the neck. Crissum pale cream-buff. Nos. 51,649, and 51,664, September 14 and 19, differ from the last in being nearly white below, with much more than the average amount of barring on the anterior portion of the back; otherwise they are nearly the same. Nos. 51,648 and 51,650 *bis* belong to the same brood, and were taken, together with their parents, on September 15. One is white below, and the other strongly tinged with ochraceous buff. The feathers of the upper surface, including wing-coverts, are edged with rusty white, and the back and scapulars have fewer black bars than in the male parent. All have liberal patches of rufous on the vertex, except No. 51,645, taken September 11, 1884, which is moulting, and losing the linear streaks on the front of the chest where the feathers are being replaced by the plain ochraceous buff of the winter plumage. This moult is usually accomplished during October, November males appearing in the adult plumage of winter. A young male (No. 92,469, Smiths. coll.) from Yreka (Shasta Valley), northern California, August 18, 1883, Chas. H. Townsend, has the upper surface heavily banded with black from the nape to the tips of the scapulars, with a line of black spots on the outer webs of (both webs of central) tail-feathers, and black shaft-streaks to the rusty crown.

Young female (Am. Mus. No. 51,644, Fort Verde, Arizona, July 18, 1884).—Above darker, more vinaceous, with heavier transverse bars on back and tail, and dusky shaft-streaks to the feathers of the rusty crown patch. Below, with the streaks broader and less yellowish than in adults.

Measurements.—Average of 13 adult males from Fort Verde, Arizona: length 269.0; alar expanse, 570.0; wing, 189.0; tail, 135.0; chord of culmen, 12.0; width of bill at base, 10.0; tarsus, 36.5; middle toe, 23.6. Average of 11 adult females from Fort Verde, Arizona: length, 276.0; alar expanse, 601.0; wing, 196.0; tail, 136.0; chord of culmen, 12.5; width of bill at base, 10.3; tarsus, 36.4; middle toe, 24.0 mm.

The largest examples of this race come from California. An old male, taken at Murphy's by L. Belding, measures as follows: wing, 201.0; tail, 140.0; chord of culmen 12.2; width of bill at base, 11.0; tarsus, 35.0; middle toe, 25.0 mm. An adult female from the same place measures: wing, 214.0; tail, 155.0; chord of culmen, 11.8; width of bill at base, 10.3; tarsus, 36.0; middle toe. 23.5 mm.

Remarks.—Three downy young about a week old were taken by Mr. E. W. Nelson, at Fort Lowell, Arizona, May 24, 1884. They are scantily clothed with loose, white down.

All of the Sparrow Hawks taken by the writer in Arizona, numbering 41 specimens, had the iris hazel; but, if the collector's notes on labels are to be relied upon, adults from Cape St. Lucas, Lower California, have the iris yellow, young birds having it colored hazel, as in the other subspecies of *sparverius*. The cere, mastax and tomia are greenish yellow in young birds, changing to yellow in adults, and becoming orange-yellow in some highly developed individuals. In like manner the feet are colored pale yellow in the young, the shade deepening to orange in adolescence, or even vermilion in some old birds. The bill is bluish at base, shading to blue-black at the extremity.

The outer tail feathers are varied with black, white, and cinereous within about the same limits as in eastern *sparverius*. In a few, mostly young birds, the outer feathers are quite regularly barred with black, white, and gray, while in one specimen (No. 51,668, Am. Mus. coll.) the tail is all rufous except the terminal whitish, the subterminal zone of black, and the outer web of the lateral feather, which is white with a black line along the shaft.

Comparing a large series of specimens of this race from various parts of the Southwest, they are found to agree in the main with those above described, though manifesting the effects of regional peculiarities to a considerable degree. Thus, in a small series from the mountains of Nevada, collected by Mr. Robert Ridgway, the size is smaller, there is a peculiar reddish coloration, and the rusty crown patch is reduced in size; while the surrounding region affords quite typical specimens of this race. Other examples from the Pacific Coast, have, also, a darker coloration than those from the interior and southern portions of California, which latter region furnishes extreme examples of *deserticolus*, which differ from those of Arizona in being still paler, and of larger size. A pair from Mazatlan, Mexico, though referable to the Great Basin form, differs appreciably therefrom in being more rufous. Coues's specimens from the Souris River, those collected by Mr. Richmond in Montana, and a number of specimens from Colorado, are too near *sparverius* for reference to this form. Similar intermediates are found in western Texas; but specimens from the eastern (seacoast) district of Texas are similar to those of Louisiana and farther eastward. Farther west, in Montana (mouth of Milk River, Coues) Wyoming, and Utah, all are *deserticolus*.

Falco sparverius peninsularis SUBSP. NOV.

ST. LUCAS SPARROW HAWK.

Habitat.—Lower California.

General characters.—A depauperate insular form, in which a diminution of the general size is accompanied by an increase in the size of the bill; also characterized by pallor of coloration, and decrease in the extent of the black markings.

Type, No. 16,930, Smiths. Inst., ♂ ad., San José, Lower California, John Xantus (original No. 269).

Adult male.—Similar to *F. s. deserticolus*, but smaller, with larger, stouter bill, with less black barring on back and scapulars, and scarcely any black spots on the wing-coverts; under side of wing mostly white, the quills being merely serrated with black next to shaft on inner webs; underparts suffused with yellow; very slightly spotted on the sides.

Adult female.—Similar to *F. s. deserticolus*, but with a more rufous shade on tail; underparts more yellowish; "iris yellow," instead of hazel. A young female in autumn is said to have had the iris hazel.

Remarks.—There is considerable variation in the specimens before me. Summer males are much bleached, the under surface being pale creamy buff, those taken in winter being rather deeply tinged with ochraceous cinnamon. Several of them have an unusual amount of white on the lateral rectrices.

It is interesting, in connection with the dwarfed size of this subspecies, to note the large size of those specimens of *deserticolus* from the adjacent portion of California, which exceed the dimensions of all others from North America.

Measurements.—Average of 6 males: wing, 172.0; tail, 116.0; chord of culmen, 12.6, width of bill at base, 10.4; tarsus, 35.3; middle toe 24.0 mm. Average of 3 females: wing, 178.0; tail, 120.0; chord of culmen, 12.4; width of bill at base, 10.8; tarsus, 34.5; middle toe, 24.0 mm. Xantus has marked an adult female as measuring 10 inches in length, and 21.75 inches in alar expanse.

Falco sparverius australis RIDGWAY.

SOUTH AMERICAN SPARROW HAWK.

Habitat.—South America, chiefly east of the Andes Mountains; replaced by *sparverius* on the North Atlantic and Caribbean coasts.

General characters.—Larger than *sparverius*, with relatively longer tail; rufous crown patch absent, or reduced to a mere trace. Male with underparts whiter, lacking the ochraceous on the chest, with the black spots on the sides elliptical, and the black subterminal zone of tail only about half as broad as in *sparverius*. Female with upper surface more vinaceous rufous, and the tail less rufescent, with the subterminal bar scarcely broader than the rest.

Adult male.—Closely resembling *sparverius*; rufous of upper surface much the same; crown pale plumbeous, or, occasionally, with a trace of rufous on the vertex, the feathers with fine black shaft streaks; transverse bars of back and scapulars sometimes blurred and shaded with plumbeous; black spots of wing-coverts large, and often cordate; tail, with subterminal bar much reduced, the tip usually white, or cinereous on the middle pair of feathers, one to several outer feathers more or less variegated. Under surface as in *sparverius*, but lacking the darker cinnamon ochraceous on the pectoral region; spots on sides, elliptical.

Adult female.—Above, similar to *sparverius*, but with little or no rufous on crown, and less heavily barred, especially on the tail, where the bars are narrower and frequently interrupted near the shaft. The tail is decidedly less rufescent, often exhibiting the grayish shade seen in the rufous of the tail in immature specimens of *Buteo borealis*. Underparts similar, but with the markings, in some, much deeper brown.

Measurements.—Average of 5 adult males from Brazil, Paraguay, and Argentine Republic: wing, 193.0; tail, 144.0; culmen (chord) 12.0; width of bill at base, 10.5; tarsus, 36.0; middle toe, 23.5. Average of 5 adult females from same general region: wing, 205.0; tail, 148.0; culmen (chord), 12.5; width of bill at base, 11.0; tarsus, 38.0; middle toe, 24.0 mm.

Falco sparverius cinnamominus (SWAINSON).

CHILEAN SPARROW HAWK.

Habitat.—Chile and western Brazil, where intergrading with *australis* (and with *aequatorialis* in Peru?).

General characters.—Size about the same as *australis*, but with the crown darker, slaty plumbeous, with broader blackish shaft streaks and little or no rufous in the centre. Tail rufous throughout, the outer feathers unvariegated, and with the subterminal black bar, in males, no broader than the rufous tip.

Adult female.—(No. 48,819, Smithsonian collection, vicinity of Santiago, Chile, January, 1863). Differs from *australis* in having the crown of a duller slaty color, and the transverse bars of tail reduced to incomplete rows of spots, leaving the outer tail-feathers plain. The coloring of the back and underparts is almost identical; but the tail is lighter vinaceous cinnamon rufous, paling to light buff on the outer feathers. The

outermost tail-feather is unspotted, the one next to it has only faint indications of spots near the inner edge of the inner web, and the third has small spots on both inner and outer webs, while the black on the middle feathers amounts only to serrations along the edges. There are indications of rufous on the feathers of the centre of the crown, as often seen in females of *australis*.

Remarks.—A male (No. 48,820, Smithsonian collection) from Santiago, Chile, taken in November, 1863, has the dark, sharply streaked crown of *cinnamominus*, with the coarser spotting of sides, and the tail with a white tip, variegated outer feathers, and broader black zone, of *australis*, and a very imperfect specimen from Peru (No. 39,952, Smiths. Inst.), seem to indicate its intergradation with the following subspecies.

Measurements.—Average of two adult males from Chile: wing, 194.0; tail, 141.0; culmen, 12.5; width of bill, 11.0; tarsus, 37.5; middle toe, 25.0 mm. Measurements of No. 48,819, ♀ ad.: wing, 200.0; tail, 147.0; chord of culmen, 13.0; width of bill at base, 11.3; tarsus, 38.5; middle toe, 26.0 mm.

Falco sparverius æquatorialis SUBSP. NOV.

ECUADOR SPARROW HAWK.

Habitat.—Ecuador.

General characters.—Size, largest. Crown slate-color, streaked with black, with or without indications of a rufous crown patch; outer tail-feathers variegated; underparts deeply suffused with tawny ochraceous buff in both sexes. Female deep rufous above, sparsely barred, with the upper tail coverts and hinder part of rump immaculate.

Types, No. 101,309, ♂ ad., Guayaquil, Ecuador, Dr. Wm. H. Jones, U. S. N., and No. 67,349, ♀ ad., Ecuador, both in the Smithsonian Institution.

Description of male type.—Crown dark slate-color, with black centres to the feathers, only one of which shows a trace of rufous; dusky of crown continuous behind with the large black patch of nape. Back and scapulars vinaceous cinnamon rufous, becoming more castaneous on rump and tail. Scapulars, and hinder and middle portion of back, heavily barred with black. Wings darker plumbeous than in the other subspecies, with large black spots on the coverts. Tail with a broad subterminal zone of black as in *sparverius*, with the tip white, tinged with rufous, and plumbeous on the tips of the central feathers; two outer tail feathers variegated, the outer being cinereous and white, with six heavy black spots on the inner web. Underparts, including crissum, ochraceous buff, deepest on the chest; lining of wings stained with ochraceous; sides with several rows of black spots, varying from elliptical to oval.

Measurements.—Wing, 196.0; tail, 149.0; culmen (chord), 12.8; width of bill at base, 9.0; tarsus, 42.0; middle toe, 25.0 mm.

Another male (No. 63,621, Smiths. Inst.), moulting, but in nearly fresh plumage, differs from the above in being much less heavily barred with black on the back and scapulars, and of a still deeper shade of tawny ochraceous below.

Description of female type.—Crown bluish slate, streaked with chestnut rufous on the vertex. Above chestnut rufous, sparingly barred with plumbeous black, the bars becoming obsolete on the rump, leaving the upper tail coverts and hinder part of rump plain; tail incompletely barred with black, the outer feathers only spotted on their inner webs. Underparts pale ochraceous buff, deepening to vinaceous cinnamon on the breast; longitudinal markings below light cinnamon, nearly obsolete.

Measurements.—Wing, 200.0; tail, 152.0; chord of culmen, 13.0; width of bill at base, 10.5; tarsus, 39.0; middle toe, 24.5 mm.

DESCRIPTION OF AN APPARENTLY NEW *CENTURUS* FROM GREAT BAHAMA ISLAND, BAHAMAS.

BY CHARLES B. CORY.

A COLLECTION of some eight hundred birds lately received from Great Bahama Island contained eight specimens of an apparently undescribed *Centurus* which I propose to call

Centurus bahamensis, sp. nov.

Type No. 19,578, Coll. C. B. Cory, Boston, Great Bahama Island, December 26, 1891. — Adult male similar to *C. blakei*, in having the entire underparts strongly tinged with olive green; the back is banded with black and yellowish green, not black and white as in *blakei*. The feathers on the flanks show a slightly reddish tinge; the forehead is dusky white; and the red at the base of the bill is somewhat darker than in *C. blakei*. Length, 9.50 inches; wing, 5.25; tail, 4.00; bill, 1.20; tarsus, .85.

The female has the forehead darker than the female of *C. blakei*, and has the under parts tinged with olive green as in the male.